SOURIS RIVER STUDY

September, 1984

Manitoba
Water
Commission

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THE MANITOBA WATER COMMISSION
847 — 405 Broadway Avenue
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September 6, 1984

The Honourable A.H. Mackling
Minister
Department of Natural Resources
Room 215 Legislative Building
Winnipeg, Manitoba
R3C 0V8

Dear Mr. Mackling:

The Manitoba Water Commission has the pleasure to present the Souris River Study Report.

Public Hearings were held by the Manitoba Water Commission at Souris and Hartney on October 4th and 5th, 1983 respectively.

The recommendations contained in this report are designed to assist the Government of Manitoba in forumlating policies relating to flooding along the Souris River.

Yours respectfully

D. A. Duncan
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Chairman

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H.M. Harapiak, M.L.A.

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SYNOPSIS

The Souris River Basin has for years been plagued with problems of either inadequate water supplies or excessive flooding. These problems have been the subject of numerous studies and investigations by both Federal and Provincial Governments, but no practical or acceptable solutions have been found.

This report confines itself to the problems of flooding in that portion of the Souris River Basin which lies between the International Boundary and the town of Hartney. As a result of the views expressed at the hearings held at Hartney, this study particularly examines the effect of the Hartney Dam, since a number of the local farmers perceived the Hartney Dam as the cause of flooding and asked that it be removed, and/or a channel diversion be constructed around the Dam.

The Commission has considered these proposals and, based on hydrological evidence, has concluded that the backwater effect created by the Hartney Dam is minimal and therefore does not cause any significant flooding to farm land, and certainly causes no flooding to the farm land in the Lauder area, several miles upstream from the Hartney Dam.

The effect of a channel diversion around the Hartney Dam was also examined and, again based on hydrological evidence, was found to have no effect on reducing the flooding along the Souris River between Hartney and the International Boundary.

It must be recognized that the land that is being farmed along the Souris River is in a flood plain, and this Commission can, therefore, recommend no comprehensive program which would effectively and substantially

reduce flood damage to the agricultural land situated between Hartney and the International Boundary. The structural alternatives which the 1978 Souris River Study considered were at that time, and still are today, not economically justifiable.

Changes in land use practices, improved road networks and land drainage works have all contributed to more rapid runoffs and increased flows, thereby altering the flood pattern over earlier years. A brief investigation of artificial drainage works in the United States indicates that individually, they may not have an effect on flooding in Manitoba. However, a report on the Garrison Diversion concluded that the Garrison project will increase the flow and duration of flooding between the International Boundary and Hartney, if implemented as originally designed.

It is therefore essential that the governments affected, and various levels thereof, continue to liaise for the purpose of establishing policy guidelines respecting present and proposed drainage works which may have an effect on the Souris River drainage basin.

SOURIS RIVER STUDY

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I. INTRODUCTION

The Souris River Basin has, over the years, been plagued with problems associated with either inadequate water supplies, on the one hand, and flooding on the other, both of which affect the social and economic well being of the residents of the Souris River Basin.

The Souris River, therefore, has been the subject of numerous studies and investigations over the years by both Federal and Provincial Government departments responsible for water resources and associated problems. The most comprehensive study was undertaken in the 1970's by the Souris River Basin Study Board, sponsored and funded by the Government of Canada and the governments of the Provinces of Saskatchewan and Manitoba, and culminating with an extensive report in June 1978. This study assessed, among other things, the problem of, and possible solutions to, the flooding of the Souris River in Manitoba in the reach from the International Boundary to Hartney. It concluded that the proposed solutions of dyking, channel enlargement and channel realignment were not economically justifiable. Several other studies and investigations have likewise concluded that there are no economically feasible flood damage reduction alternatives. However some of the farmers in the area are not prepared to accept these findings and believe that the Hartney Dam is largely responsible for the flooding along the Souris River and therefore should be removed, or that a diversion channel be constructed around the Hartney Dam. In addition they recommend construction of channel cutoffs in the Lauder-Sandhills area and that other channel improvements be undertaken.

Because these individuals and groups who are affected by the floods continue to relate their economic difficulties to flooding along

the Souris River, the Minister of Natural Resources, under Terms of Reference dated July 20, 1983 directed the Manitoba Water Commission to:

1. Review the previous studies that deal with this subject;
2. Examine the causes of flooding along the Souris River in Manitoba including, for example, artificial drainage in the headwater areas and operation of upstream reservoirs in North Dakota and Saskatchewan;
3. Convene public hearings to receive public input;
4. Recommend any appropriate action that could alleviate flooding and its impacts along the Souris River in Manitoba;
5. If it is determined that works in North Dakota are causing an increase in flood damages, recommend steps that should be taken to initiate corrective action;
6. Submit a report as soon as it is practicable to do so.

In accordance with the said Terms of Reference, The Manitoba Water Commission held public hearings in Souris and Hartney on October 4th and 5th, 1983, respectively. Approximately one dozen persons attended the Souris meeting but no one presented a brief or wished to make any oral submission to the Commission at Souris. The Hartney meeting had a larger attendance with eight briefs presented. The concerns expressed in the briefs related primarily to flood damage to agriculture in the Souris River Valley and the need for measures to curb the duration of the floods, and suggested solutions therefor.

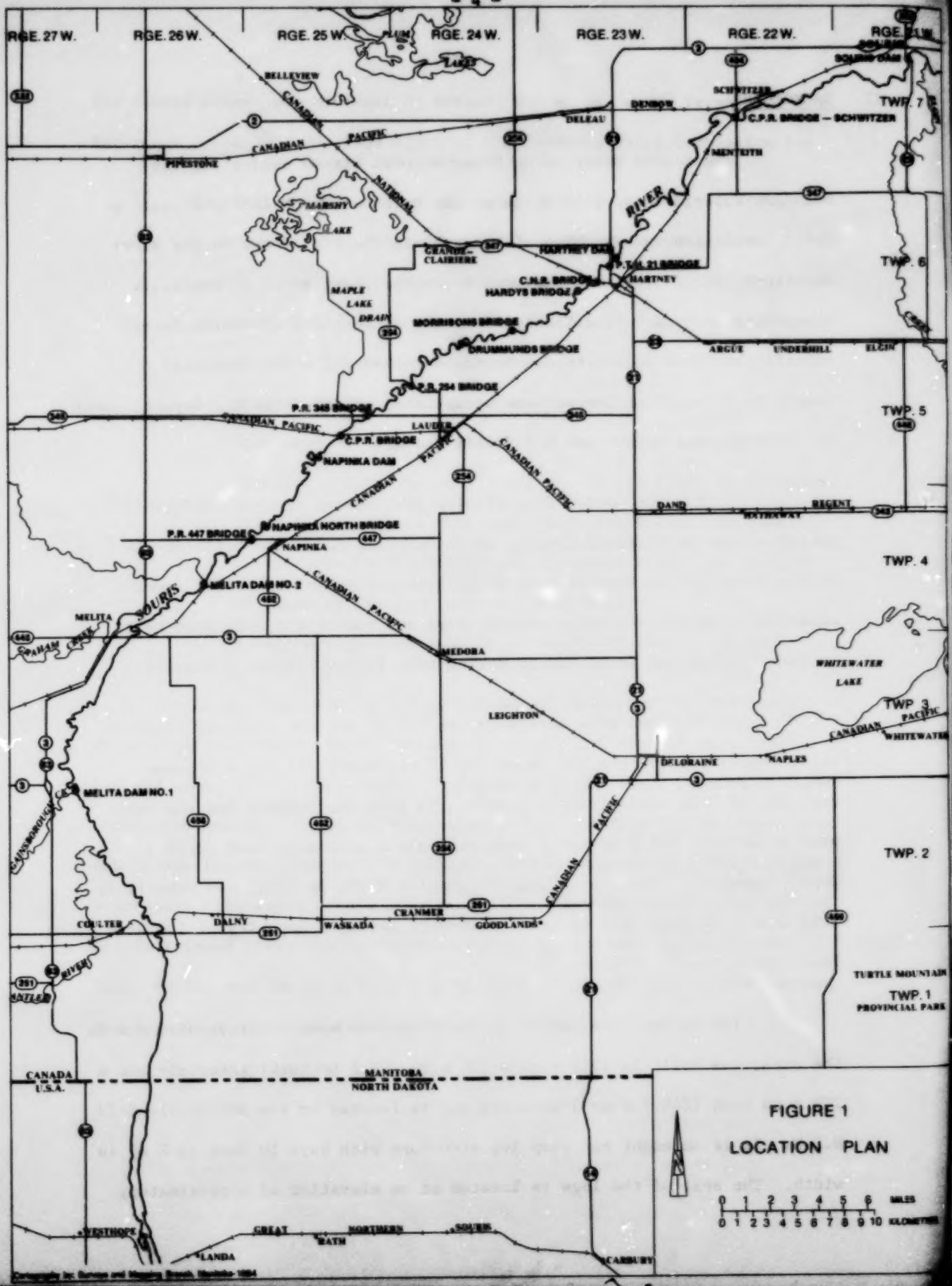
II. BACKGROUND

The Souris River is an international stream subject to the Boundary Water Treaty of 1909, under the terms of which the International Joint Commission was established to regulate the use of the Souris River on either side of the International Boundary. Regulation is necessary since what happens to the Souris River in Saskatchewan and North Dakota affects the flows in Manitoba. During the 1940's the International Souris River Board of Control was established to supervise the apportionment of flows between Canada and the United States.

During the period from 1930 to 1941 severe drought conditions prevailed and as a result several stock watering dams were built on the Souris River by the Prairie Farm Rehabilitation Administration. Stock watering, domestic and multi-purpose dams and reservoirs were also built in Saskatchewan and North Dakota during this period (Figure 1 Page 4).

In 1937 two dams were built at Melita and the combined areas of their reservoirs covered 250 acres (101.2 hectares) and had a storage capacity of 1200 acres (1480.2 $dams^3$). In 1938 the Napinka Dam was built with a 120 acre (48.6 hectare) reservoir and a 1000 acre foot (1233.5 $dams^3$) capacity. The Souris Dam, originally built in 1911, was rebuilt in 1935 with a 20 acre (8.1 hectare) reservoir having a capacity of 150 acre feet (185.0 $dams^3$) of water.

The Hartney Dam, which is currently the most controversial dam in the area, was built in 1941 with a 100 acre (40.5 hectare) reservoir and a 200 acre foot (246.7 $dams^3$) capacity and is located on the SW¼ of 21- 6-23 W.P.M. It is an eight bay stop log structure with bays 10 feet (3.0 m) in width. The seat of the logs is located at an elevation of approximately


RGE. 27 W.
RGE. 26 W.
RGE. 25 W.
RGE. 24 W.
RGE. 23 W.
RGE. 22 W.
RGE. 21 W.
TWP. 7
TWP. 6
TWP. 5
TWP. 4
TWP. 3
TWP. 2
TWP. 1
BELLEVIEW
PIPESTONE
CANADIAN PACIFIC
NATIONAL
MARSHY LAKE
LAKE
DELEAU
DENBOW
SCHWITZER
C.P.R. BRIDGE – SCHWITZER
MENTEITH
RIVER
GRANDE-CLAIRIERE
HARTNEY BAR
T.R. 21 BRIDGE
HARTNEY
C.N.R. BRIDGE
HARDYS BRIDGE
MAPLE LAKE DRAIN
MORRISONS BRIDGE
DRUMMUNDS BRIDGE
ARGUE
UNDERHILL
ELGIN
P.R. 254 BRIDGE
P.R. 345 BRIDGE
LAUDER
C.P.R. BRIDGE
NAPINKA DAM
NAPINKA NORTH BRIDGE
P.R. 447 BRIDGE
NAPINKA
MELITA DAM NO. 2
MELITA
SOURIS
PAHAM CREEK
MEDORA
DAND
HATHAWAY
REGENT
WHITEWATER LAKE
LEIGHTON
DELORAINE
NAPLES
WHITEWATER
MELITA DAM NO. 1
CAINSBOROUGH
COULTER
DALNY
WASKADA
CRANMER
GOODLANDS
TURTLE MOUNTAIN PROVINCIAL PARK
CANADA
U.S.A.
MANITOBA
NORTH DAKOTA
GREAT NORTHERN
SOURIS
BATH
LANDA
CARBURY
BIRTHOPE
FIGURE 1
LOCATION PLAN
MILES
KILOMETRES

1373.0 feet (418.5 m) a.s.l. and each bay has the capacity for eight 6" x 8" x 10' stop logs to provide a top-of-log elevation of approximately 1378.1 feet (420.0 m) and top of dam elevation of 1385.0 feet (422.1 m) a.s.l.

With all the logs removed, the Hartney Dam can, for example, pass a flow of 2000 cfs (56.6 m^3/s) at elevation 1380' (420.6 m) a.s.l.; 3400 cfs (96.3 m^3/s) at 1383' (421.5 m) which is the elevation of the lower abutment of the dam; and 8100 cfs (229.4 m^3/s) at 1387' (422.8 m) a.s.l. the elevation of the higher abutment.

The Napinka Dam is situated on the SW¼ 9- 5-25 W.P.M. It is a concrete slab and pier dam with eight bays 8 feet (2.4 m) wide. The seat of the logs is situated at an elevation of 1385.5 feet (422.3 m) a.s.l. and each bay has nine 6" x 8" x 10' stop logs with top-of-log elevation of 1391.5 feet (424.1 m) a.s.l. and top elevation of the dam at 1403.0 feet (427.6 m) a.s.l.

When the Napinka Dam was originally built in 1937 the top of the abutment of the piers was at 1396.5 feet (425.6 m) a.s.l. In 1948 the dam was rehabilitated. Piers one, three, five and seven were reduced by 5 feet (1.5 m) to an elevation of 1391.5 feet (424.1 m) while piers two, four and six were raised 5.5 feet (1.7 m) to an elevation of 1402.0 feet (427.3 m). The two abutments were raised to an elevation of 1403.0 feet (427.6 m) a.s.l.

All of the above dams were constructed and designated for stock watering purposes. Since the introduction of legislation which restricts feedlots along the river, these dams are no longer utilized for stock watering purposes.

The Manitoba portion of the Souris River did however provide seven farmers with a water supply for irrigating approximately 1560 acres (631.33 hectares) of land in 1983.

III. SOURIS RIVER - physical features

The Souris River originates north of Weyburn in the Province of Saskatchewan, and flows southeasterly through Saskatchewan into North Dakota beyond Minot, thence back north across the International Boundary into Manitoba through Melita, Hartney, Souris on to its confluence with the Assiniboine River at a point approximately 25 miles (40.2 km) southeast of Brandon, and finally through the Nelson River system into the Hudson Bay (Figure 2).

Channel capacity of the Souris River in the reach between the International Boundary and the Town of Hartney is relatively small varying from 150 to 1700 cfs (4.2 to 48.1 m^3/s), with many sections being approximately 1000 cfs (28.3 m^3/s). Immediately north of the International Boundary the channel capacity* is 150 cfs (4.2 m^3/s); adjacent to the Coulter Dam it is 500 cfs (14.2 m^3/s); at Melita it is 1400 cfs (39.6 m^3/s); near Lauder 1100 cfs (31.1 m^3/s); and at Hartney 1700 cfs (48.1 m^3/s). However, approximately five miles (8.0 km) downstream from Hartney the channel capacity increases to approximately 3000 cfs (85 m^3/s).

The width of the Souris River in Manitoba ranges from 65 to 150 feet (20 to 46 m) and the depth of the channel varies from 5 to 25 feet (1.5 to 7.6 m). The total length of the Souris River is approximately

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*Note: All channel capacity figures given are approximations

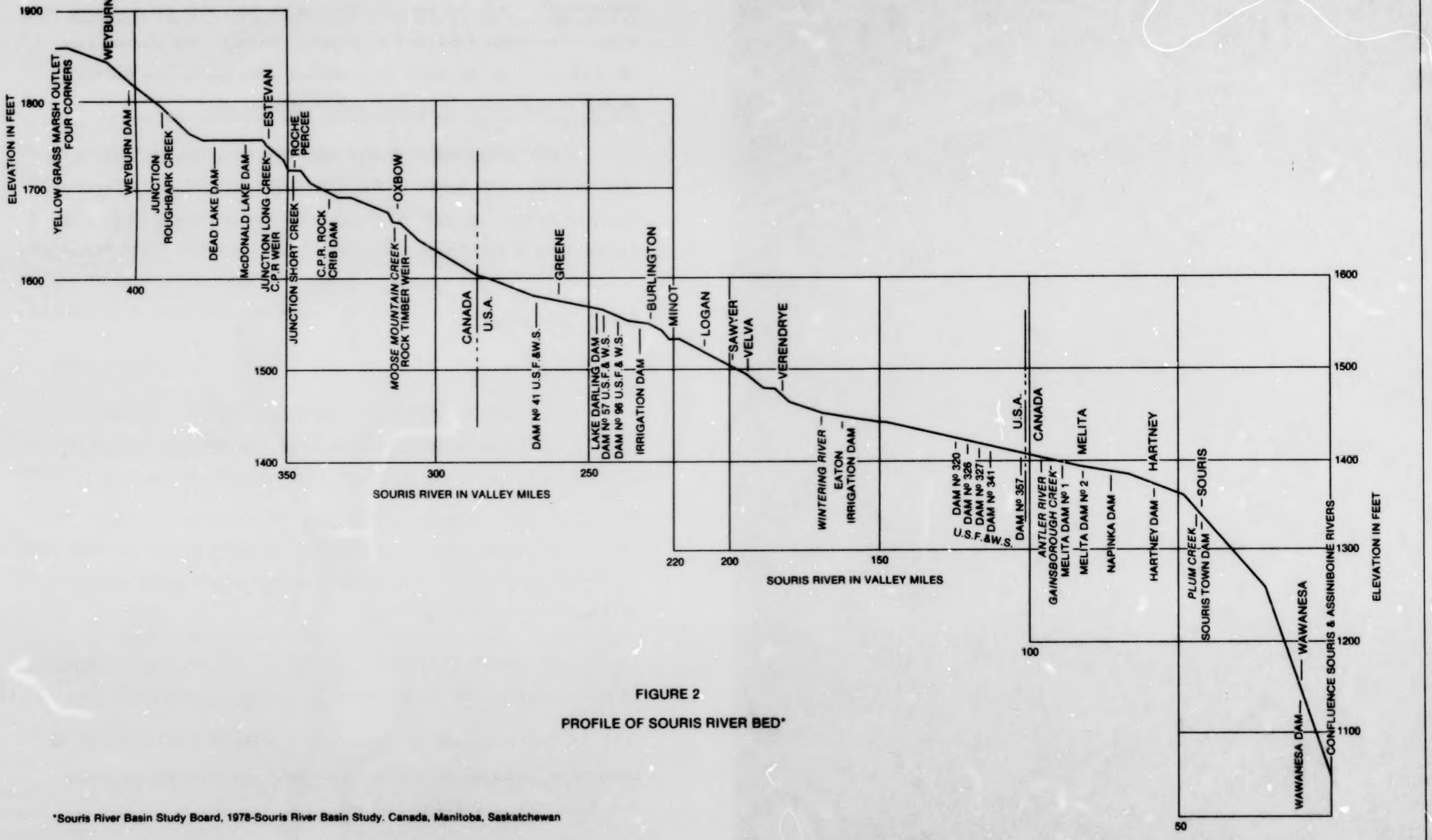

FIGURE 2

PROFILE OF SOURIS RIVER BED*

*Souris River Basin Study Board, 1978-Souris River Basin Study. Canada, Manitoba, Saskatchewan

Cartography by: Surveys and Mapping Branch, Manitoba 1984.

495 miles (797 km). The elevation of the Souris River in the U.S. drops approximately six inches per mile (9.45 cm per km), with the same drop in elevation extending from the U.S. border to Hartney. The nineteen mile (30.6 km) reach of the Souris River channel above the Hartney Dam has a uniform mild gradient of approximately 0.0143 percent.

Most of the annual flow of the Souris River and its tributaries comes from snow melt and spring rains, with the annual volume of flow varying from 3400 acre feet (4194 $dams^3$) in 1937 to 2,100,000 acre feet (2,590,350 $dams^3$) in 1976.

IV. SOURIS RIVER BASIN

1. Physical Features

The total drainage area of the Souris River is approximately 17,600 square miles (45,584 km^2) of which 3870 square miles (10,023 km^2) are in Manitoba and 11,450 square miles (29,655 km^2) are in Saskatchewan with the remainder being in North Dakota. The principal tributaries which flow into the Souris River in Manitoba are the Antler River, the Gainsborough and Plum Creeks with the tributary drainage area comprising approximately 6600 square miles (17,094 km^2).

The terrain in the Manitoba portion of the basin is basically flat to gently rolling. The average depth of the Souris Valley is 100 feet (30.5 m).

The climate varies from semi-arid in the western portion of the basin to sub-humid in the eatern portion where the water deficit ranges from 2.5 to 5 inches (6.3 to 12.7 cm).

Precipitation varies considerably from year to year in the Souris River Basin with the highest precipitation occurring in the Manitoba portion.

2. Groundwater

It has been estimated that approximately 80 percent of the people in the Souris River Basin are dependent upon groundwater for domestic purposes. However, the availability of the groundwater varies with location. It is plentiful in the north-central part of the basin and north of the river between Souris and Wawanesa. The quality of the groundwater is poor between Napinka and Boissevain, while both limited supply and poor quality is prevalent in the area north and west of Melita.

3. Basin Economy

Agriculture is the dominant economy consisting primarily of grain and beef production. There are a few small manufacturing and food processing plants in the area but the majority of employment is dependent upon agriculture.

There are two Provincial parks in the Souris River Basin, i.e., Oak Lake Provincial Recreational Park and the Turtle Mountain Provincial Natural Park. The Souris River in Manitoba is used for canoeing and casual angling.

There is moderately good fishing on the Souris River near Coulter and below the dam at Wawanesa. The Souris River Valley upstream from Souris provides spawning grounds for northern pike and perch, while spawning habitat for walleye is found downstream from Souris and at Oak Creek.

Waterfowl producing and migration areas are found at Whitewater Lake, the Maple Lakes, the Oak and Plum Lakes and the Turtle Mountain.

V. FLOODING IN THE SOURIS RIVER BASIN

1. History of Flooding

Following the drought, which ended in 1942, the Souris Valley area experienced a series of wet years, with ten of the fourteen years from 1943 to 1956 witnessing fairly extensive flooding to the agricultural land, particularly between the International Boundary and Hartney.

From 1957 to 1968, with the exception of 1960, no cultivated land was flooded but the number of acres of flooded pasture land varied from zero to 640 (259 hectares). Since 1968 severe flooding occurred in 1969, 1974, 1975, 1976 and 1979.

Flows exceeding bank-full capacity near Melita occurred in nine years out of the last fifteen years and in eight of these years the flows were twice bank-full capacity.

In 1969 the peak flow at Melita was 10,800 cfs (305.8 m^3/s) and in 1976 it was 19,600 cfs (555 m^3/s). The 1969 flood was deemed to be a 1:33 year flood whereas the 1976 flood was a 1:133 year flood.

Since 1913 eight major floods have been recorded - i.e., 1949, 1956, 1960, 1969, 1974, 1975, 1976 and 1979.

There is some evidence to suggest that during the large floods which occurred in 1882 and 1904 peak flows at Melita were approximately 30,000 cfs (849.5 m^3/s) in 1882 and 17,000 cfs (481.4 m^3/s) in 1904.

On the average, some flooding occurs on the Souris River between the International Boundary and Hartney every second year with the Lauder area being subjected to the most extensive flooding.

2. Causes of Flooding

As previously indicated, the lack of channel capacity of the Souris River between the International Boundary and Hartney, which varies from 150 cfs to 1700 cfs (4.2 m^3/s to 48.1 m^3/s), is largely responsible for flooding the flat terrain of the surrounding area. The river overflows at relatively low flows. Thus when flows reach 2040 cfs (57.8 m^3/s), as in 1960 for example, 6800 acres (2572 hectares) of cultivated and pasture land were flooded; at 3050 cfs (86.4 m^3/s), as recorded in 1972, 9790 acres (3962 hectares) of cultivated and pasture land were flooded. Most of the damage to cultivated land occurs in the Melita and Lauder areas.

Land drainage is also responsible for flooding. Although it increases the rate and shortens the period of local runoff on the one hand, it increases the quantity of flood runoff, on the other, since it reduces the potential storage available in natural retention areas such as sloughs and depressions.

It is also acknowledged that the construction of roads over the past several decades has affected the natural drainage patterns of the area. There is some evidence that these structures retain water and restrict the flow.

"During the 1940's, new agricultural techniques, extensive land clearing of natural cover from upland areas and expansion of services such as roads (and accompanying ditches) dramatically increased the amount of water entering the existing drainage system."*

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*"A Review of Agricultural Drainage in Manitoba", August, 1977, Manitoba Water Commission Report

There has been some suggestion that the frequency and duration of flooding in the Souris River Valley has been increasing. One of the reasons for this may be the increase in the degree of variability in precipitation which has occurred in the last few years. Other factors include increased removal of natural vegetation and proliferation of drainage ditches, particularly at the Municipal and individual farm levels.

Storage works, particularly in the United States, may reduce flood peaks in Manitoba, but this tends to increase the duration of flooding conditions, because the water is released over a longer period of time.

3. Artificial Drainage

There have only been three artificial drainage works of note constructed in the Manitoba portion of the Souris River Basin, namely: Pipestone Creek Diversion Channel, Belleview Drain and the Maple Lake Drain, all of which are deemed to have very little effect on the flood levels of the Souris River.

The Maple Lake Drain, unlike the other two drains, however, is a tributary of the main stem of the Souris River. It services an estimated area of 40 square miles (103 km^2) of agricultural land and has a discharge capacity of approximately 154 cfs (4.36 m^3/s). One of the conditions of operation and design of the Maple Lake Drain was that no water is to be released from Maple Lake into the Souris River if the flow at Lauder exceeds 1000 cfs (28.4 m^3/s). Thus the controls are operated in such a way that during flood periods only the local runoff goes into the drain and flows into the Souris River, in parallel with the situation which existed prior to the construction of the drain.

Drainage developments along the streams in eastern Saskatchewan which flow eastward to join the Souris River in Manitoba are viewed with concern by those Manitoba landowners who reside in the Souris basin. There are three projects in eastern Saskatchewan, namely, Kipling, Silverwood and Maryfield Flood Control, that drain into the Pipestone Creek and add approximately 30 square miles (77.8 km^2) of drainage to the Pipestone Creek. Also three square miles (7.8 km^2) is added to the Antler River drainage area by a drain in the Glen Ewen district.

The 1978 Souris River Study did not consider these drainage developments to have any significant effect on the downstream flood flows and the Souris River in Manitoba. It also concluded that the Yellow Grass Marsh drainage project had virtually no effect on the flows of the Souris beyond the Estevan area eastward.

The proposed White Spur Drain and Stone Creek Channelization project in eastern Bottineau county in North Dakota is currently being examined by the Manitoba Department of Natural Resources in order to determine what effect, if any, it may have on the flows of the Souris River in Manitoba. This project is being proposed in order to drain approximately 6,480 acres (2,622 ha) of wetland and convert it into cropland.

Based on information received from the North Dakota Water Commission, it is estimated that the resulting increase in flows on the Souris River at the International Boundary would be less than 0.3 percent, and that the peak flows would not be affected since the runoff from the White Spur project would reach the Souris River before the upstream peaks. The timing here is, of course, the important factor. It should be noted that none of these projects are designed to individually add large increases of water to the Souris

River, however the cumulative effect is a concern that should not be overlooked.

At present the Lake Darling Task Force, established under the International Joint Commission, is reviewing the impact of the proposed Lake Darling Flood Control project on Canada.

Artificial drainage in North Dakota and Saskatchewan were cited during the 1983 public hearings as causes of increased flows on the Souris River between the International Boundary at Hartney. In order to ascertain the effect in Manitoba of artificial drainage in North Dakota and Saskatchewan it would be necessary to undertake an extensive study which would require a great deal of time, i.e., several years, and even then, the data collected may be of doubtful value insofar as flood controls on the Souris River are concerned.

Some of our concern is being addressed by the Prairie Provinces Water Board which has established a Task Force known as the "Inter-provincial Task Force" made up of representatives from the Provinces of Manitoba and Saskatchewan whose purpose is to examine specific problems relating to artificial drainage on a series of inter-provincial streams, and monitor drainage activities on both sides of the border. It will be some time before the results of this undertaking are available. The Manitoba Water Commission recommends that the Manitoba representatives on the Prairie Provinces Water Board ensure that the specific problems of the Souris River be addressed, including projects in the state of North Dakota.

4. Effect of Flooding on Agriculture

The extent of agricultural damage in the Souris River Valley is determined by the date, extent of and duration of flooding. It has been stated by some local farmers that normally in order to ensure no reduction in yield, crops should be seeded by May 15th. Approximately twenty-one days are required for the land to drain off and be sufficiently dry for tilling and seeding. Thus local farmers claim that any inundation of land after April 25th means that crops cannot be seeded until after May 15th, which may result in reduced productivity. In 1976, for example, a total of 19,450 acres (7,871 hectares) of land between the International Boundary and Hartney were inundated of which 8570 acres (3468 hectares) were cultivated, and 8700 acres (3520 hectares) were pasture, and because of the prolonged flooding there was insufficient growing time for any crop production. However, these are generalizations. Other factors have to be taken into account such as evaporation rates and soil moisture content prior to flooding. It appears that in most situations seeding should be completed no later than the first week of June.

Summer floods mainly affect the low lying pasture land, most of which is located between the International Boundary and P.R. #251 near Coulter, whereas the spring floods affect both cultivated and pasture land along the Souris River from the International Boundary to Hartney. Flood damages to agriculture for the period from 1936 to 1982 are shown on Table 1, Page 17. It should be noted that the amount of damage is directly correlated to the

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Note: There are approximately 2,300,00 acres (931,000 hectares) of farmland in the Souris River watershed in Manitoba, of which approximately 1,700,000 acres (688,000 hectares) are improved agricultural land.

"Improved Land" means land that is or was cultivated.

volume of water, as reflected in the acreage flooded, rather than the date of the peak of the flood.

The data contained in Table 1 was obtained from the 1978 Souris River Basin Study, Supplement 2, Volume 2, and updated to 1982 levels by R.W. Harrison, P. Eng., Manitoba Department of Natural Resources, using the following method.

"Crop prices and production costs were updated to 1982 levels using Statistics Canada data for Manitoba. The two sources used were "Farm Input Price Index (1971=100)" and "Index Numbers of Farm Prices Agricultural Products (1971=100)" published by the Manitoba Department of Agriculture. The production costs per acre and crop prices were updated to 1982 levels by using the ratios of 312.3/164.0 and 309.7/227.5 respectively. In terms of 1982 levels and dollars, the weighted average annual return per acre of cultivated land would amount to $120.70. . . This represents a significant increase in the annual returns of $51.10 per acre used in the Souris River Basin Study. This can be largely attributed to a marked departure in recent years from summerfallow and to higher yields being realized with improved management practices. The value of tame hay on pastureland was revised from the 1975 value of $40 per ton in the Souris River Basin Study to $50 per ton for 1992.

In keeping with the methodology outlined in Supplement 2 of S.R.B.S. report, acreage not seeded by June 20 (Manitoba Crop Insurance Corporation final date of seeding) was assumed to sustain maximum damage which is considered to be equivalent to the gross income minus production costs per acre. The first day of grazing in a non-flood year was retained as May 15".*

*Department of Natural Resources - Inter-departmental memo R.W. Harrison to R.J. Bowering, April 30, 1984.

Table 1

SOURIS RIVER VALLEY AGRICULTURAL FLOOD DAMAGES FROM THE INTERNATIONAL BOUNDARY TO TOWN OF HARTNEY (1936 to 1982)

Year	Date of Peak at Melita	Agricultural Acreage Flooded			Flood Damages (1982 $)		
		Cultivated Land	Pasture Land	Total	Cultivated Land	Pasture Land	Total
1936	Apr. 16	0	0	0	$ 0	$ 0	$ 0
1937	June 12	0	0	0	0	0	0
1938	Mar. 22	0	0	0	0	0	0
1939	Apr. 6	0	0	0	0	0	0
1940	Apr. 25	0	0	0	0	0	0
1941	Apr. 16	0	0	0	0	0	0
1942	Apr. 17	0	0	0	0	0	0
1943	May 24	2,730	4,400	7,130	316,900	59,600	376,500
1944	July 14	1,220	3,440*	4,660*	190,300*	43,500*	233,800
1945	Apr. 4	0	870*	870*	0	900*	900*
1946	Apr. 3	820	1,540	2,360	0	0	0
1947	Apr. 20	1,340	3,320	4,660	18,100	9,600	27,700
1948	Apr. 30	5,190	5,710	10,900	543,200	75,900	619,000
1949	Apr. 23	6,370	6,830	13,200	432,000	37,000	469,000
1950	May 25	3,440	4,970	8,410	455,600	71,900	527,500
1951	May 9	5,280	5,900	11,180	622,100	77,400	699,500
1952	Apr. 28	520	2,090	2,610	17,000	5,400	22,400
1953	Aug. 17	670*	2,440*	3,110*	113,700*	31,500*	145,200*
1954	July 17	1,610*	3,600*	5,210*	260,000*	55,800*	461,000*
1955	Apr. 19	4,970	5,770	10,740	591,600	90,900	682,500
1956	Apr. 14	3,950	5,320	9,270	404,300	63,800	468,100
1957	June 25	0	90*	90*	0	2,100	2,100
1958	Apr. 5	0	40	40	0	100	100
1959	June 7	0	10*	10*	0	100*	100*
1960	Apr. 8	2,560	4,240	6,800	92,600	18,000	110,600
1961	Apr. 5	0	0	0	0	0	0
1962	Apr. 11	0	0	0	0	0	0
1963	June 25	0	290*	290*	0	2,400	2,400
1964	May 17	0	280	280	0	1,500	1,500
1965	June 26	0	630	630	0	12,500	12,500
1966	May 4	0	630	630	0	5,400	5,400
1967	Apr. 19	0	640	640	0	31,300	31,300
1968	Sept. 9	0	0	0	0	0	0
1969	Apr. 17	7,420	7,570	14,990	838,800	91,500	930,300
1970	June 5	4,360	5,360	8,940	549,200	111,800	661,000
1971	May 6	400	1,780	2,180	26,800	16,300	43,100
1972	Apr. 21	4,350	5,440	9,790	325,400	39,100	364,500
1973	May 24	0	210	210	0	1,800	1,800
1974	Apr. 25	7,130	7,310	14,440	828,000	113,400	941,400
1975	May 12	6,980	7,170	14,150	906,900	146,600	1,053,500
1976	Apr. 12	8,570	8,700	17,270	980,300	110,600	1,090,900
1977	Mar. 14	0	0	0	0	0	0
1978	Apr. 28	0	540	540	0	2,700	2,700
1979	May 22	6,560	6,900	13,460	865,700	121,000	986,700
1980	Apr. 9	0	70	70	0	100	100
1981	Mar. 12	0	110	110	0	800	800
1982	May 1	2,710	4,540	7,250	265,700	38,100	303,800

*Summer flooding

1 acre = .4047 hectares

VI. THE GARRISON DIVERSION UNIT

The Commission was surprised that the Garrison Diversion Unit was not raised as a potential problem at the Public Hearings. This can, perhaps, be attributed to the desire of most of those who presented briefs to focus specifically upon the Hartney Dam. The members of the Manitoba Water Commission believe some comment in this report is necessary since the present design of the Garrison project will affect the flows of the Souris River in Manitoba.

The Garrison Diversion Unit, a multi-purpose water resource project, was authorized by the United States Congress in 1965. It was originally designed to divert the waters from the Missouri River into North Dakota for purposes of irrigation of 250,000 acres (101,175 ha) of land, municipal and industrial water supply for 14 cities, and development of recreation, fish and wildlife resources in the area. Because the original design of the Garrison project would have resulted in return flows from the irrigated land, municipal and industrial wastes and foreign biota entering the Souris and Red River systems and the Hudson Bay drainage basin, construction of the project was halted in 1977. Since that time Canada has been negotiating with the United States to ensure that the final plans for the project will be such so as not to adversely affect Canadian waters, nor increase flooding of agricultural lands along the Souris River in Manitoba.

The August, 1977, report of the International Joint Commission entitled "Trans-boundary implications of the Garrison Diversion Unit", stated that 200 acres (81 ha) of agricultural land along the Souris

River in Manitoba would be flooded as a result of the Garrison project. An earlier analysis made in 1974, of the original design of the Garrison project, concluded that "the additional return flows from the Garrison Diversion Unit would significantly increase the duration of flooding in Manitoba".*

The areas of the channel which were investigated were immediately north of the International Boundary, at Coulter, Melita and near Lauder, where the approximate channel capacities are 150, 500, 1400 and 1100 cfs (4.2, 14.2, 39.6 and 31.1 m^3/s) respectively. The period studied was 1930 to 1972. It was found that the four locations studied would be exposed to overbank conditions for a greater number of days because of the Garrison project. Coulter at 500 cfs (14.2 m^3/s) capacity, for example, would experience flooding one out of every eight days during the six month period from June to November, compared to one day in eleven for recorded 1930 to 1972 conditions.

Greater concern, quite understandably, is being placed on the wastes and foreign biota entering the Souris River and Hudson Bay system, than on the increase in flows and flooding aspect of the project. The Commission is concerned that all deliberations respecting the Garrison Diversion Unit keep in mind that any increase in flows on the Souris River, especially in the spring, would exacerbate the extent and duration of flooding that already exists.

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*Environment Canada Inland Water, Manitoba Department of Mines, Resources and Environmental Management, Some Effects of the Garrison Diversion Unit on the Souris River in Canada, November, 1974.

V11. PUBLIC HEARINGS

The following individuals and representatives of organizations presented briefs at Hartney on October 5, 1983:

1. Harry Thompson - Melita Businessman
2. Everett Barker - Melita Farmer and Businessman
3. Ron Renwick - Reeve of the Rural Municipality of Arthur (Chairman of the Souris River Water Commission which includes all the municipal bodies with drainage into the Souris River)
4. Charlie Gall - Councillor for the Town of Melita (representing the Mayor and Council of the Town of Melita)
5. Wayne Drummond - Farmer and Councillor of the Town of Hartney
6. Ray Duthie - Representative of Souris Valley Flooded Area Association
7. Reg Atkinson - Mayor of the Town of Hartney and Farmer
8. Walter Penno - Farmer
9. Zacharias Waldner - Manager, Maple Grove Colony
10. Art Cowan - Reeve of the Rural Municipality of Cameron

Key quotes from the above submissions are found in Appendix II. Page 36.

SUMMARY OF PUBLIC HEARINGS

The general consensus of the submissions was that floods are inevitable in the flood plain of the Souris River. They emphasized that duration of the floods has increased over the years, therefore either some remedial measures ought to be taken to reduce the duration of the flood, or to provide those farmers who suffer crop losses some relief through financial compensation or property tax reduction.

The majority believed that the Hartney Dam was largely responsible for the flooding upstream and that it should be removed. Some questioned the usefulness of, or need for the dam, while one specifically thought the dam should remain and a diversion channel built around it, and if at any time there were low flows on the Souris River, the dam would then be useful.

The drainage works in Saskatchewan, North Dakota and Manitoba were also cited as a major cause for the increased flow and duration of flooding in the area between the International Boundary and Hartney.

It was stated that over the past several years drains in the Souris River Basin have been improved, but no corresponding channel improvements were made to handle the increased flows.

Roads and bridges were cited as causes for slowing down the flow of water thus extending the duration of the flood, and that larger culverts and bridges would ease this problem.

Several stated that there is a great deal of debris and silt in the Souris River particularly from the Hartney Dam to the Napinka area, which they believed restricts the flow, and reduces the channel capacity. They suggested

that the debris should be removed and that the channel should be dredged to increase its capacity.

It was also suggested that the oxbows be cut out and the river be straightened in order to provide better drainage of the flood plain. However, one person specifically did not agree with this recommendation.

Several believed there should be more co-operation and exchange of information between the three governments i.e., Manitoba, Saskatchewan and North Dakota, regarding drainage works in their respective areas and water management in the Souris River Basin. However, the suggestion of a member of the Commission to establish a Conservation District in the entire area did not receive support.

VIII. REVIEW AND DISCUSSION OF PREVIOUS STUDIES

It is interesting to note that the concerns expressed and solutions proposed during the recent Souris River public hearings have not changed since the 1970's when the extensive Souris River Basin Study was done. In addition, since the 1978 report, some of the residents of the area continued to make representations to the government for implementation of those proposals which were found by the 1978 study and subsequent investigations to be either economically not feasible or non effective. For example, removal of the Hartney Dam in particular, as well as the Napinka and Melita Dams, was proposed by the local residents in the 1970's and was again proposed in 1983 as a solution to the flooding problem.

This recommendation was rejected by the Souris River Study Board based upon findings that the removal of these dams would have little impact on flood reduction. It was noted that headwater loss through each of these dams did not exceed 0.4 feet (.1 m) during the 1976 spring flood, and at low flows head losses diminished to less than 0.1 foot (3 cm) at bank-full capacity. The corresponding change in stage is only 30 cfs (.8 m^3/s) for 0.1 feet (3 cm). In spite of these findings the local residents continue to believe that the backwater effect of the Hartney Dam is responsible for their flooding problem as far back as 30 river miles (48.3 km) upstream.

It was further noted by the Study Board that the dams were built during the period when drought conditions prevailed and their removal would have a negative impact should there be periods of low flows such as those experienced in the 1930's and mid 60's. The years 1977 and 1978 were dry years and it is quite possible that the 1980's and beyond may experience arid conditions, and the dams would again prove useful.

The 1978 Study considered a proposal by the Souris River Valley Flooded Area Association for realignment of the Souris River channel in the Lauder-Sandhills area, and the construction of a diversion channel around the Hartney Dam. This proposal was also raised during the 1983 public hearings. In addition, the Rural Municipality of Cameron passed resolutions calling on the Government of Manitoba to upgrade the Hartney Dam and construct channel cutoffs in the Lauder area.

The 1978 Study Report determined that realignment of the Souris River Channel and construction of a diversion channel around the Hartney Dam would involve excavation of approximately 300,000 cubic yards (229,365 m^3) of material at a cost of $300,000.00 (in 1978). The effectiveness of channel cutoffs in the Lauder-Sandhills area in terms of lowering the water level were found to be very minor compared to the cost.

With respect to the effects of a diversion around the Hartney Dam, a further report was prepared in December 1979 by Water Resources Branch of the Manitoba Department of Natural Resources which concluded that "the effect of the excavated channel was a slightly reduced head loss through the dam and a slight decrease in the depth of flow immediately upstream of the dam. No change in the degree or duration of flooding resulted from the excavated channel. The maximum benefit from the excavation in terms of stage reduction occurred immediately upstream of the dam. This reduction in stage was only 0.03 to 0.04 feet"* (.09 - .12 cm).

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*Harrison, R.W., Manitoba Department of Natural Resources, Water Resources Branch, "Report on the Effects of Hartney Dam Channel By-Pass". December, 1979.

Insofar as the request to upgrade the Hartney Dam is concerned, Water Resources Branch Engineers indicate that discharge capabilities of the Hartney Dam, either through modifications to the existing structure or through construction of a channel by-pass, can only be increased if corresponding increases in channel capacity are effected along the downstream reaches of the channel.*

Reference to the amount of debris in the river and the need for its removal, particularly around bridges and dams, was made in the 1978 report, and again at the Hartney hearings in 1983. The 1978 Study maintained that debris accumulations at dams and bridges have very little effect on the water levels during high discharges of flow, and estimated a maximum head loss due to debris of 0.4 feet (12 cm) during the 1976 flood.

It was noted that a general clearing of trees and shrubs along the channel might reduce the amount of debris falling into the river, but the negative effect is that the banks of the river would become more susceptible to erosion with the removal of the roots of these trees which provide a stabilizing effect. The Water Resources Branch is at present responsible for cleaning out the debris which accumulates around the dams and bridges.

The Souris River Study Report noted that some bridges and highway culverts did restrict the flow of water during the spring of 1976 and did cause significant flooding. This point was reiterated during the public hearings in Hartney. The 1978 Report recommended that those agencies, departments or governments who owned, or under whose jurisdiction these structures fell, be requested to review the adequacy of these structures

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*Letter - Brian Ransom, Minister, to R. Laing, R.M. of Arthur, dated July 20, 1980.

and take appropriate corrective measures to enlarge their capacity where necessary.

In June 1979, J.F. Waggoner of the Department of Natural Resources prepared a report entitled "Flood Investigation Along the Souris River at Provincial Road No. 447". This study investigated the different design structures of the road and hydraulic opening which would ensure that upstream backwater effects remain minimal. As a result of this study the Department of Highways in 1981 increased the span of the bridge on P.R. #447 by sixty-six feet (20.1 m) to reduce the backwater effect caused by the then existing structure.

At the 1983 public hearings it was proposed that there be proper drainage control of waters on the tributaries by way of dams. This question was addressed by the 1978 study which reviewed the feasibility of headwater storage of spring flows on the Antler River and the Gainsborough, Graham and Jackson Creeks.

The reservoirs proposed for the Graham and Jackson Creeks which would have had a total capacity of approximately 5870 acre feet (7240.6 $dams^3$) were deemed to provide no perceptible effect on the Souris River flows.

The reservoirs proposed for the Antler River and Gainsborough Creek (i.e., construction of Coulter and Patterson Dams) would have had a combined storage capacity of 48,000 acre feet (59208 $dams^3$) and an estimated cost of 8.4 million dollars (1978$). These proposed reservoirs were deemed to be ineffective in reducing agricultural damage due to the prolonged duration of flooding, since both the Antler River and the Gainsborough Creek contribute very little to the flows of the Souris River after the end of April. They might, however, provide some reduction to flood damage at the town of Melita.

A number of other flood damage reduction proposals were investigated by the 1978 study, but not recommended because of the cost-effectiveness factor. The proposal to construct dykes along the Souris River from Peninsula Bridge to P.R. #345 to accommodate 4600 cfs (130.2 m^3/s) passing through without flooding was estimated to cost $2.4 million.

A proposal to construct dykes and enlarge the channel from the Peninsula Bridge to P.R. #345 to permit 12,800 cfs (362.4 m^3/s) to pass through without flooding was estimated to cost $10 million.

The proposal to enlarge the channel from P.R. #345 to the Antler River to permit peak flows of 4100 cfs (116.1 m^3/s) from April 25 to September 30 was estimated to cost $14.7 million.

It was pointed out that "to lower the water surface elevation of P.R. #345 to bank-full elevation of a discharge of 4100 cfs (116.1 m^3/s) would require channel enlargements for an additional nineteen miles (30.6 km) downstream". This would "involve enlarging a total of sixty-one miles (98.2 km) of river channel"...and "the excavation of eighteen million cubic yards (13.7 million cubic metres) of material"* which would cost approximately eighteen million dollars (1978$).

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*1978 Souris River Basin Study Report.

RECOMMENDATIONS

Introduction

The Terms of Reference provided by the Minister of Natural Resources, the Honourable A.H. Mackling, were very broad and allowed for an examination of the whole Souris River and drainage basin within Manitoba. The Commission scheduled meetings to allow all interested citizens a forum to present their opinions on the problems of this important river. It became apparent from public response that the major focus of concern was the problem of flooding, particularly along that portion of the river from the United States border to the Town of Hartney. More specifically there was a great deal of concern expressed about the effects of the Hartney stock watering dam during periods of high water. Although the public chose to narrow the area of concern, the Commission recommendations address themselves to the larger problems of the drainage basin. It is the opinion of the Commission that the specific concerns of the citizens must be considered in the context of the changes that have been made to the entire drainage basin, and that solution of some of the specific problems can only be dealt with in general terms.

Several people who presented briefs at the public hearings were of the opinion that the Hartney Dam was specifically responsible for extensive flooding upstream from the structure. There is no question that there is a backwater effect when logs are in the dam, however this effect is limited to a relatively short distance upstream. There is no evidence that the structure impedes the flow of water during flood conditions when all the logs are removed. This river has already flooded in the Melita-Lauder area long before the flow capacity of the Hartney dam is reached.

From the Wintering River in North Dakota to the Hartney Dam (See

Figure 2) the Souris River has the lowest gradient in its entire course. Beyond Hartney to the Assiniboine River the gradient is the steepest and the channel capacity five miles (8 km) downstream increases to approximately 3000 cfs (84.95 m^3/s). Therefore the stretch from Hartney to the International Boundary would experience more frequent and more extensive flooding under natural conditions.

It is unfortunate that the location of the Hartney Dam makes it the focus of that which is a natural situation. Therefore, the Commission does not consider that removal of the dam will resolve the flooding problems of the area. The dam was installed as a stock watering structure during the dry years of the 1930's in response to the request of the local farmers. It had two functions: (1) to hold sufficient water through a hot, dry summer; and (2) to maintain water depth to prevent freezing to the bottom in the winter. Restrictions on feedlots close to the river have reduced the demand for stock watering but this need is being replaced by the increase in irrigation operations.

The dry conditions of this spring (1984) serve to emphasize the necessity for keeping in place those structures created for the arid conditions of the 1930's. This will be particularly true if the forecasts of global warming and increasing aridity in the prairie region of Canada due to the greenhouse effect are correct.

In addition, the continued changes to the whole drainage basin from Saskatchewan through North Dakota to Manitoba, and the implications of these changes, need to be monitored and discussed, possibly under the aegis of the International Joint Commission. It is most unfortunate that such an extensive project as the 1978 Souris River Basin Study, was undertaken

without the active participation of North Dakota. It has become obvious that changes to one part of a river system have an effect on other parts of that system and that the problems in one area are often created by the solution of problems in other areas.

Based upon these assumptions the Manitoba Water Commission recommends the following actions with regard to the growing problems on the Souris River:

1. Research should be carried out to identify those privately owned lands that are within the flood plain with a view of having the Crown purchase them as they become available. Only those lands with a high flood risk should be purchased and perhaps leased back for agricultural purposes so that land need not be unproductive if it has capabilities. Other lands should be identified with regard to their flood risk, and present or future owners should be made aware that land is farmed at their own risk.

   Rationale: A great deal of this land can produce good crops in those years when flood waters recede quickly and early planting can be achieved. They are also productive in drier years when other higher ground suffers from dry conditions. Nonetheless this is land that is not considered valuable, a fact that is usually reflected in the market price. Private ownership of marginal or flood prone land should therefore be discouraged so as to minimize the subsidization of high risk occupancy.

2. A meeting be arranged at the executive level of Government of the Provinces of Manitoba and Saskatchewan, and the State of North Dakota to establish policy guidelines for liaison on any activities that would have an effect on the waters of the Souris River Drainage Basin.

Rationale: It is the understanding of the Commission that some liaison agencies exist but participation and effectiveness, especially at the political level, have been poor. The geophysical interdependency dictates that political liaison must be effective otherwise the situation will continue to deteriorate.

3. An examination of the total network of drainage ditches should be carried out. This examination should determine the length and density of ditches, and estimate their average runoff in order to determine the rate and timing at which water is removed from the land and placed into the natural river system. Those drainage ditches, which can be modified to act as temporary storage reservoirs, should be identified and weirs with culverts at the bottom should be constructed so that water is retained at an upper limit not to exceed the natural water table of the area. This would not only provide removal of the water from the surface to allow agricultural activities to commence but it would also retard the rate at which that water is added to the spring run-off in the Souris River.

Rationale: There seems little doubt that the proliferation

of drainage ditches designed to remove snowmelt from agricultural lands has altered the pattern of flooding along the Souris River. This has further altered the drainage of natural wetlands which previously acted as reservoirs holding water from snowmelt and rain events but now that water is put almost directly into the river.

4. Before construction of all future municipal drainage ditches there should be consultation with, and approval of, the Provincial Department of Natural Resources so that responsibility and control for the administration of the entire drainage system is established.

Rationale: The Commission recognizes that the Municipalities presently have jurisdiction over the construction of certain drainage ditches, however the continued unchecked expansion is not considered wise management of the soil and water resources. The Commission is also aware that the proposed Water Rights Act (not yet proclaimed) may contain provisions to alleviate this problem.

5. Based on previous studies and investigations, the Manitoba Water Commission has concluded that removal of the Hartney and Napinka Dams will have no appreciable effect on flood reduction in the area between the International Boundary and Hartney, therefore these structures should not be removed.

Rationale: It would appear that we may be moving towards a cycle of dry years and these dams will again serve a useful

purpose. It also would appear that the flooding problems on that portion of the Souris River from the United States Boundary to the town of Hartney are being aggravated by increased rates and volumes of drainage rather than the presence of these structures.

6. The Water Resources Department should prepare studies and make plans to offset as much of the increased flood effect due to Garrison as is economically and technically feasible, once the final plans have been determined.

Rationale: One of the purposes of the Garrison project is flood control, therefore it is quite likely that there will be some increase in flows on the Souris River as a result thereof.

7. The Water Resources Branch should reduce the size of the regional areas of responsibility of the Field Managers so that each may be able to provide more attention to local concerns and issues.

Rationale: Several people at the public hearings and in discussion with the Commission commented on the remoteness of control and decision-making concerning their region and the effects this has on the understanding of local issues. Much of the hostility of rural people to government stems from this remoteness of decision-making concerning their region. More effective management and better public relations would undoubtedly be achieved by this recommendation.

APPENDIX I

Souris River

Terms of Reference

to the

Manitoba Water Commission

Agricultural lands along the Souris River Valley are repeatedly inundated by spring floods. This situation is particularly severe in the reach from the International Boundary to Hartney where the minimum channel capacity is about 150 cfs. However, most damage occurs to cropland in the Melita and Lauder reaches where channel capacities are about 1300 cfs. In some flood years the prolonged duration of flooding and consequent delay of seeding in these reaches is such that no cropping occurs. On the Souris River near Melita, peak flows exceeding bankful capacity have occurred in 9 years out of the last 15 years and flows equal to or more than twice the bankful capacity have occurred in 8 years out of the last 15.

Flooding and flood reduction options along the Souris River in Manitoba are subjects that have received a great deal of attention as evidenced by the large volume of correspondence and numerous reports addressing these subjects. Unfortunately, past studies have been unable to suggest economically feasible solutions that could effectively reduce the periodic flooding and associated damage in this area. The Souris River Basin Study undertaken jointly by Canada, Manitoba and Saskatchewan between 1974 and 1978 identified and evaluated numerous flood damage reduction options.

Recommendations of the Souris River Basin Study indicate that mitigation works or compensation should be considered where upstream storage or drainage works have resulted in increased flooding at downstream locations. However, no action has been taken as a result of these recommendations.

Although the Souris River Basin Study and other investigations undertaken have revealed that there are no economically justifiable agricultural flood damage reduction projects, residents in the area are reluctant to accept these results and continue to press for removal of the Hartney Dam, cutoffs in the Lauder-Sandhills area and other channel improvements. Since affected individuals and groups such as the Souris Valley Flooded Farmers Association continue to relate economic difficulties with flooding along the Souris River, the Manitoba Water Commission is hereby directed to:

1. Review the previous studies that deal with this subject;
2. Examine the causes of flooding along the Souris River in Manitoba including, for example, artificial drainage in the headwater areas and operation of upstream reservoirs in North Dakota and Saskatchewan;
3. Convene public hearings to receive public input;
4. Recommend any appropriate action that could alleviate flooding and its impacts along the Souris River in Manitoba;
5. If it is determined that works in North Dakota are causing an increase in flood damages recommend steps that should be taken to initiate corrective action;
6. Submit a report as soon as it is practicable to do so.

July 20, 1983

Honourable Al Mackling
Minister of Natural Resources.

KEY QUOTES FROM SUBMISSIONS PRESENTED AT PUBLIC HEARINGS

1. **Mr. Harry Thompson**

- Private Brief - a motel owner

"The tremendous amount of drainage that has taken, and is taking place in the State of North Dakota, if not halted, will see our portion of the Souris River Valley flooded for most of the crop season, with an economic loss to this area yearly in excess of 3 million dollars." ...

"Although I condemn our U.S. neighbours, I must also mention ourselves as Manitobans and our Saskatchewan neighbours to the west, who have been draining wetlands and are basically the stem of our problem."

"...you can't blame people for wanting to crop the land that is being taxed excessively, but we didn't have the problem until we had the excessive drainage. Our road building system is such now that every mile of road they build will drain about five sections of land, whereas it didn't before." ...

"Our Yellow Grass drain is basically the stem of the problem. The Yellow Grass drain is just in Saskatchewan, and that starts the ball moving as they drain an excessive amount of water into United States and then the United States wants to get rid of it." ...

"I belong to the Souris Valley Flood and Farmers Association and the briefs presented by them to the Souris Basin Study in 1977 had some very good suggestions. They suggested that many oxbows be cut out of the Souris River. That would increase the flow. We realize you can't prevent a flood, but we certainly don't have to put up with it for month after month, which

we did this year, whereas everything else dries up and we are sitting there letting the water trickle away and we can't get any crop in."

"...the Hartney Dam is definitely, definitely a problem. It has held water back and caused all the troubles, or most of the troubles, that exist today." ...

"We have a problem in one respect. We have a head of the department looking after the dams on the Souris River from Hartney to the border who works out of Neepawa, and Neepawa is a long way from the Souris River. We need somebody that is sitting there watching it most of the time, and can realize that the dam is full of logs and should be cleaned out and let the water go. We don't have that."

2. Mr. Everett Barker

- a Melita Farmer and Business Man

"...we have approximately 1100 acres that we farm in the river basin alone, and we say you can't really stop the flooding, but it just stays there and stays there, and we can't get our crop in." ...

"The flood doesn't matter so much, if it would come and go... if it's out of there by the first of April, and then dries up by the end of April, we can get our crops in and everything would be fine."

"...the main problem, I think is not even so much the drainage from around our own area, from people draining into the river, but rather it's caused from more work being done in North Dakota and Saskatchewan to correct their problems." ...

"We've got good roads now, but those roads are acting like pretty good dams." ...

"Well it makes it so that when they (Saskatchewan) want to get rid of the water, they can; and when it gets into the States they can't handle any more water, so they push it through to us. That is what happens and we have to take it. There is no way to stop them, except that the Hartney Dam is slowing it down here on us. It is not getting through. Once it gets past Hartney there doesn't seem to be any problems."

3. Mr. Ron Renwick

- Reeve of the Rural Municipality of Arthur
- Chairman of Souris River Water Commission

"Drainage, which was not taken into consideration in the Souris River Basin Study, probably has the most impact on the flooding." ...

"I believe most of the drainage has been done in the last fifteen years in the Souris River Valley... . Almost 60,000 acres of the Clark-Salyer Refuge south of the Manitoba border has several dams to maintain marsh areas to raise ducks, with Lake Darling for a supply level, which has a significant impact on the levels in Manitoba." ...

"The Souris River topography, as has been indicated here, is very flat in this area, and the water tends to run very slow. The roads and dams which have been built across the valley, have also had a tendency to slow the water down, and as a result much silt has built up in the river over the years." ...

"We must be a part of any plans for water management on the Souris River. I believe water management can come about in the entire valley, if

we all understand the problems in the entire valley. Our problem is duration flooding as you've heard today. ...but we cannot eliminate duration flooding without proper management. If structures are to be built we must also streamline parts of the valley, which would be dredging; possibly some of the dams redesigned; some of the bridges larger or put in the right place..."

"...I think we must remember that we have times when there is a very low flow in the Souris, and if the water was managed it could come at that time, rather than at the tail end of a duration flood."

4. Mr. Charlie Gall

- Councillor of the Town of Melita

"The concern here is not the actual flooding, but the time element, the time it takes the flood waters to retreat. Suggestions to reduce flooding of the Souris River which would increase water quality for the Town of Melita's supply and assist agriculture and business locations in the flood plains are:

1. The river to be channeled through the sandhill area downstream from Melita, to increase the flow;
2. Proper drainage control of waters on the tributaries, by ways of dams. This method could also add to the recreation aspect;
3. Better drainage of flood plains, back into the river with the retreat of the flood waters."

5. Mr. Art Cowan

- Reeve of the Rural Municipality of Cameron

"...in our opinion the river has changed because the flows are obviously higher and the duration is obviously longer... ."

"...the people that farm the flats along the river should not be expected to bear all the cost, because the river has changed."

"...you don't feel sorry for the people that bought land within the last ten years, seven or eight years, but the people that are long time residents, ...should be compensated if it is not feasible to move the water through one way or the other. That is the feeling I have; either cure the problem or make restitution to these people."

6. Mr. Wayne Drummond

- Councillor of Rural Municipality of Cameron

"In the years that I have resided along the Souris River, there have been many years of flooding and flood related problems. ...Since 1969 major flooding has been a common occurrence in our municipality." ...

"In 1969 the river became filled with trees and debris and thus a silting problem resulted, which cut channel capacity down considerably. Since the Souris River meanders so much in the R.M. of Cameron, this problem is concentrated to a section of river between the Provincial Road #345 and the Hartney Dam. Also, since 1969, the Souris River has seen greater volumes of water pass through its banks, because of government drainage projects in Saskatchewan, North Dakota and Manitoba. Also, individual land owners see the need to reclaim land which was destined to be water reservoirs since creation. People have improved their land by these drains, but no one has improved the river channel to handle the increased flows. Another problem

which most residents feel is the main problem, is the Hartney Dam. ...Farmers feel that it causes prolonged flooding below 1300 cfs."

7. Mr. Ray Duthie

- Souris Valley Flooded Area Association

"Flooding has occurred eleven out of fifteen years in the Lauder area." ...

"For this area I recommend that the Hartney Dam be removed because I feel it prolongs flooding long after the peaks occur. This flooding increases the duration of receding low flows. Channelization will likely be necessary... due to silting and bank erosion caused by the dam. ...Also, I recommend that Manitoba join with Saskatchewan and North Dakota so as to be aware of all new construction, such as the Lake Darling extension and Rafferty Dam and also more accurate flood forecasting." ...

"I don't think anybody could prevent flooding, we're just trying to prevent the duration of the flooding... .

8. Mr. Reg Atkinson

- Mayor of Hartney

"...we've been talking about what harm the dam does. I wonder if we just thought for a minute about what good it does and it really doesn't do too much good, that I know of... .

"We've got to start clearing things on that river and I would say that the dam has got to be the end of the line because that's why you're

here and that's why all we ever hear about is the Hartney Dam, not the Souris Dam, and not in between." ...

"I don't have too much sympathy for the people that bought in the recent past, such as myself. I bought that land in 1975 and I knew it flooded, so I'm not asking for favors because I was aware of that situation. It's the people back down the river, first and second generations, that have seen their farms change, that we have to consider. But I really question that the dam does that much good...if it's the end of a link that's causing thousands of dollars damage down the chain, then it certainly should be remedied, and if the river changes as much in the next twenty years as in the past twenty, then the whole town is going to be flooded. There's been so many changes upstream, that I really think that you folks have no choice but to act."

9. Mr. Walter Penno

- A Local Farmer

"Now we've been flooded out on our place twenty-five times since I came there with my father in 1941, and we've lost twenty-one crops on that land." ...

"We are not arguing about the amount of water that comes down the channel - it's the length of time it stays there."

"...that Hartney Dam must back it up well into the flood plain west of Napinka, ...the complete removal of the dam...would give the river a chance to flush itself out and most certainly shorten the duration of flooding in spring run-off." ... "There has been talk of straightening the river in places; this to my way of thinking would be a waste of money." ...

"We realize we are on the flood plain and will be flooded for a short period in high run-off years, but we would not be in the financial position we are in if the dam (Hartney) was not there."

"...water is released from the U.S.A. When they have too much, they have to open the gates, be it spring, summer, or fall and we are in trouble. Please have it (the Hartney Dam) removed."

10. Mr. Zacharias Waldner

- Maple Grove Colony

"All in total, we feel we have four hundred acres or over that is under water in most years." ...

"As far as I can see, the Hartney Dam is responsible for most of it, as it has been choking the water by having a concrete wall at the bottom and a concrete wall on the sides... ."

"There are old bridges, supports from abandoned bridges like the one on Highway 254, where the concrete could be removed to allow better run-off." ...

"My suggestion to the problem is to make a channel the width and depth of the river as it is one mile or so upstream, not at the bend where it's washed in... ."

When Mr. Waldner was asked if it was his recommendation to leave the Hartney Dam in, his reply was:

"Yes, but make a good channel around it. In case something happens they can fill it in, and then it's there again; and that would prove if it's good or not."

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FIGURE 3

SOURIS RIVER BASIN

Map of Study Area

Study Area
Boundary of Souris River Basin
Major Roads & Highways
Railroads

Kilometres 10 0 10 20 30 40 50 Kilometres
Miles 10 0 10 20 30 40 Miles

Cartography by: Surveys and Mapping Branch
Province of Manitoba, 1984

POOR

QUALITY

ORIGINAL